Wilshire Consulting

2013 Report on State Retirement Systems: Funding Levels and Asset Allocation

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Summary of Findings

- The following study includes 134 state retirement systems. Of these 134 retirement systems, 109 systems reported actuarial values on or after June 30, 2012 and 25 systems last reported prior to that date.
- Wilshire Consulting estimates that the ratio of pension assets-to-liabilities, or *funding ratio*, for all 134 state pension plans was 73% in 2012, down from an estimated 77% in 2011. This deterioration in funding ratio was fueled by global stock market volatility in the twelve months ending June 30, 2012. Growth in fund assets could not keep up with growth in plan liabilities over fiscal 2012. (Exhibit 1)
- For the 109 state retirement systems that reported actuarial data for 2012, pension assets and liabilities were $1,825.9 billion and $2,660.1 billion, respectively. The funding ratio for these 109 state pension plans was 69% in 2012, down from 73% for the same plans in 2011. (Exhibit 2)
- For the 109 state retirement systems that reported actuarial data for 2012, pension assets shrank by 1.2%, or $21.7 billion, from $1,847.6 billion in 2011 to $1,825.9 billion in 2012 while liabilities grew 4.8%, or $122.2 billion, from $2,537.9 billion in 2011 to $2,660.1 billion in 2012. The continued steady growth in liabilities for the 109 state pension plans led to an increase in the plans' aggregate shortfall, as the -$690.3 billion shortfall in 2011 grew to a -$834.2 billion shortfall in 2012. (Exhibit 2)
- For the 133 state retirement systems that reported actuarial data for 2011, pension assets and liabilities in that year were $2,420.0 billion and $3,269.6 billion, respectively. The funding ratio for these 133 state pension plans was 74% in 2011. (Exhibit 1)
- Of the 109 state retirement systems that reported actuarial data for 2012, 95% have market value of assets less than pension liabilities, or are *underfunded*. The average underfunded plan has a ratio of assets-to-liabilities equal to 68%.
- Of the 133 state retirement systems that reported actuarial data for 2011, 93% were *underfunded*. The average underfunded plan has a ratio of assets-to-liabilities equal to 71%.
- State pension portfolios have, on average, a 64.8% allocation to equities – including real estate and private equity – and a 35.2% allocation to fixed income and other non-equity assets. The 64.8% equity allocation is higher than the 63.4% equity allocation in 2002 and largely reflects a rotation out of U.S. public equities and into non-U.S. equities, real estate and private equity. (Exhibit 13)
- Asset allocation varies by retirement system. Twenty-one of 134 retirement systems have allocations to equity that equal or exceed 75%, and 12 systems have an equity allocation below 50%. The 25th and 75th percentile range for equity allocation is 60.2% to 72.5%.
- Wilshire forecasts a long-term median plan return equal to 6.9% per annum, which is 0.9 percentage points below the median actuarial interest rate assumption of 7.8%. One should note that Wilshire's assumptions range over a conservative 10+-year time horizon, while pension plan interest rate assumptions typically project over 20 to 30 years.

Financial Overview

This is Wilshire Consulting's seventeenth report on the financial condition of state-sponsored defined benefit retirement systems and is based upon data gathered from the most recent financial and actuarial reports provided by 134 retirement systems sponsored by the 50 states and the District of Columbia. Appendix A lists the 134 retirement systems included in this year's study.

The Data

Financial data on public retirement systems lack the timeliness and uniform disclosure governing pension plans sponsored by publicly traded companies, making it difficult to conclude a study with data that are both current and consistent across systems. For this reason, our study methodology involves collecting data during the first one and a half months of each calendar year with the objective of acquiring as many reports as possible with a June 30 valuation date from the previous year. Even for systems with the desire to report in a timely manner, it often takes six months to a year for actuaries to determine liability values. One hundred nine systems reported actuarial values on or after June 30, 2012 and the remaining 25 systems last reported prior to June 30, 2012.

Assets versus Liabilities

Exhibit 1 shows the market value of assets, actuarial value of assets, and pension liability values for all state retirement systems for which Wilshire has data. With the exception of the two rows identifying Wilshire's estimated funded ratios, the data presented in each column of Exhibit 1 are limited to only those systems that reported on or after June of that year. For example, 133 of the 134 retirement systems in our survey reported actuarial values for 2011, while only 109 systems reported actuarial values for 2012. Note that Exhibit 1 includes both market value and actuarial value of assets. Unless otherwise noted, "assets" will refer to market value of assets for the remainder of this report.

Exhibit 1
Financial Overview of State Retirement Systems[1] ($ billions)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total Pension Assets:											
Market Value	$1,696.0	$1,799.6	$2,017.6	$2,181.4	$2,379.1	$2,695.4	$2,402.8	$2,015.8	$2,211.7	$2,420.0	$1,825.9
Actuarial Value	$1,942.8	$1,986.0	$2,053.5	$2,141.8	$2,280.1	$2,465.9	$2,516.8	$2,471.7	$2,499.7	$2,465.7	$1,910.5
Total Pension Liabilities:	$2,081.1	$2,221.9	$2,343.1	$2,486.8	$2,646.9	$2,833.2	$2,976.1	$3,132.7	$3,233.4	$3,269.6	$2,660.1
Difference:											
Market Value	-$385.1	-$422.4	-$325.5	-$305.4	-$267.8	-$137.7	-$573.3	-$1,116.9	-$1,021.7	-$849.6	-$834.2
Actuarial Value	-$138.3	-$236.0	-$289.5	-$345.0	-$366.7	-$367.3	-$459.4	-$661.0	-$733.7	-$803.9	-$749.6
Market Value of Assets as a % of Liabilities:											
All Plans (**estimate**)*	81%	81%	86%	88%	90%	95%	81%	64%	68%	**77%**	**73%**
Reported Plans (actual)	81%	81%	86%	88%	90%	95%	81%	64%	68%	74%	69%
Actuarial Value of Assets as a % of Liabilities:											
All Plans (**estimate**)*	93%	89%	88%	86%	86%	87%	85%	79%	77%	**76%**	**74%**
Reported Plans (actual)	93%	89%	88%	86%	86%	87%	85%	79%	77%	75%	72%
Total No. of Retirement Systems:	134	134	134	134	134	134	134	134	134	133	109

** The estimation process is explained later in the report (exhibit 3 and its preceding text).*

The aggregate pension asset and liability values in Exhibit 1 are not directly comparable across columns because of the different number of retirement systems included for each year. As such, in the case of the most recent two years that do not yet include data for the complete set of plans, we include an estimate of the funding ratios across all 134 plans. By combining these estimates with the historical funding ratios for the complete set of plans we can better evaluate the financial health for these 134 retirement systems over the last ten years. Market value funding ratios rose steadily in tandem with global stock markets from 81% at fiscal year-end 2002 to the recent-period best 95% funded ratio as of fiscal year-end 2007. Over the next two years, funded ratios fell precipitously, reaching a nadir of 64% by fiscal year-end 2009. However, recovering capital markets allowed funding ratios to rebound to an estimated 77% at fiscal year-end 2011. The recent volatility in global stock markets, especially in response to the protracted economic turmoil in continental Europe, dampened plan investment performance relative to fund liabilities. Some of that liability growth may also be attributed to a number of plans lowering their assumed discount rates (used to value their projected plan liabilities); the median discount rate for the plans in our survey dropped from 8.0% in fiscal 2011 to 7.8% (more precisely, 7.75%) at fiscal year-end 2012. The aggregate market value-based funded ratio for our survey plans stands at an estimated 73%.

Actuarial value funding ratios have declined fairly steadily over the ten year period between fiscal year-end 2002 and fiscal year-end 2012, from 93% to an estimated 74%. Actuarial accounting practices incorporate smoothing procedures to mitigate asset valuation volatility in plan projections; one product of these accounting conventions is notably lower variability of actuarial value-based funding ratios.

[1] As disclosed in annual reports (most annual reports use a June 30 or December 31 fiscal year). Liabilities are the reported actuarial accrued liabilities and assets are the current market and actuarial values as of the same valuation date as liabilities.

Exhibit 2 shows asset and liability values for the 109 retirement systems which reported actuarial values for 2012 and compares them with the same totals from the previous ten fiscal years.

Exhibit 2
Financial Overview of 109 State Retirement Systems ($ billions)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Annualized Growth % 2002-2012	2011-2012
Total Pension Assets:													
- Market Value	$1,261.8	$1,298.8	$1,467.0	$1,586.0	$1,721.6	$1,989.5	$1,856.2	$1,447.2	$1,583.8	$1,847.6	$1,825.9	3.8%	-1.2%
- Actuarial Value	$1,422.5	$1,451.9	$1,507.2	$1,567.9	$1,661.0	$1,798.5	$1,858.0	$1,826.2	$1,842.7	$1,878.0	$1,910.5	3.0%	1.7%
Total Pension Liabilities:	$1,552.3	$1,663.0	$1,765.3	$1,876.3	$1,999.0	$2,143.1	$2,261.1	$2,387.3	$2,456.1	$2,537.9	$2,660.1	5.5%	4.8%
Difference:													
- Market Value	-$290.5	-$364.2	-$298.3	-$290.3	-$277.3	-$153.6	-$404.9	-$940.1	-$872.4	-$690.3	-$834.2		
- Actuarial Value	-$129.7	-$211.2	-$258.1	-$308.4	-$337.9	-$344.6	-$403.0	-$561.2	-$613.5	-$659.9	-$749.6		
Assets as a % of Liabilities:													
- Market Value	81%	78%	83%	85%	86%	93%	82%	61%	64%	73%	69%		
- Actuarial Value	92%	87%	85%	84%	83%	84%	82%	76%	75%	74%	72%		
Underfunded Plans as %													
- Market Value	94%	95%	91%	90%	85%	70%	91%	100%	98%	92%	95%		
- Actuarial Value	70%	77%	83%	87%	87%	85%	89%	93%	93%	94%	96%		
Total No. of Systems:	109	109	109	109	109	109	109	109	109	109	109		

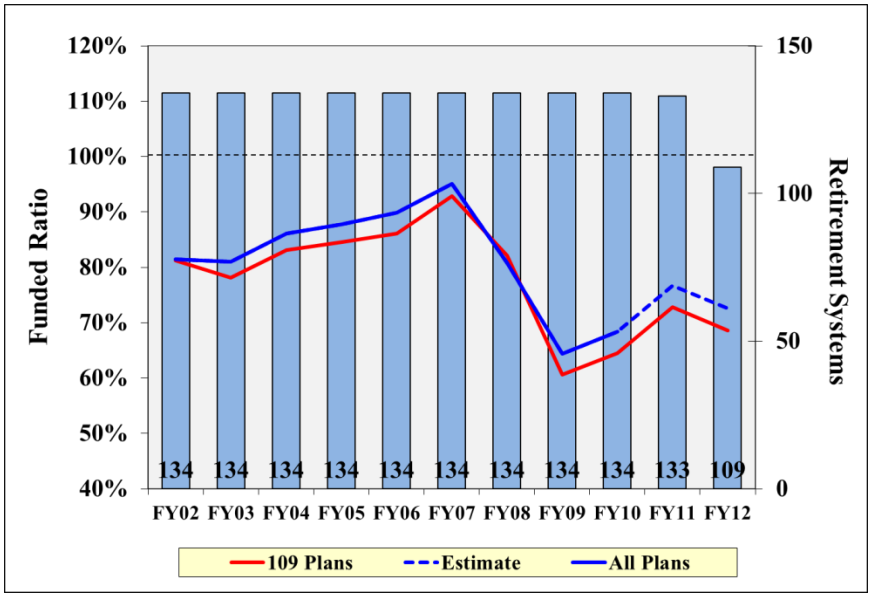
In 2011, pension liabilities for these 109 plans exceeded assets by $690.3 billion and the funding ratio, or ratio of assets-to-liabilities, one measure of pension fund health, stood at 73%. One year later, assets have slipped to $1,825.9 billion, a change of -1.2%, while liabilities have grown to $2,660.1 billion, a rate of 4.8%. The result has been an increase in the shortfall between assets and liabilities from -$690.3 billion to -$834.2 billion, a $143.9 billion increase, and a fall in the funding ratio for these 109 plans from 73% to 69%.

In 2003, after the equity market declines of 2000 through 2002, pension liabilities for these 109 plans exceeded assets by $364.2 billion and the funding ratio stood at 78%. During the next four years, assets grew at an average rate of 11.2% while liabilities grew by 6.5%. This difference in growth rates is reflected in the increasing funding ratio of the market value of assets to liabilities through the year 2007. In 2008 however, the shortfall between assets and liabilities widened dramatically from -$153.6 billion to -$404.9 billion, leading to a fall in the funding ratio for these 109 plans from 93% to 82%. 2009, as mentioned above, extended this trend as the effects of the global market dislocations of 2007 and 2008 fully impacted fund performance. Funding ratios recovered from the 2009 low of 61% through fiscal year-end 2011's 73% level; however, funded ratios pulled back to an aggregate 69% for the 109 plans discussed here.

It is important to note, as with any sample, there exists some level of statistical error. Although the 109 funds with 2012 fiscal year data constitute a sizable majority of the state plans in our survey, one will find some transient variance in sample data from the entire plan cohort. Exhibit 3 provides a graphical comparison between the historical data of all plans versus the subset of 109 plans with more recently reported data. The dotted line represents Wilshire's estimated funding ratio for the complete set of 134 plans, which is derived from the historical relationship between the 109-plan sample and the complete set of 134 plans. Using this approach one can

reasonably expect a fiscal 2012 funding ratio of approximately 73% once all plans have reported 2012 actuarial data. This estimation approach and graphical representation of estimated data will be used throughout the remainder of this report.

Exhibit 3
Funding Ratio Comparison of 109 Plan Sample vs. Complete Set of 134 Plans



Funding Ratios

Expanding on Exhibit 3, Exhibit 4 shows the aggregate, average, median, 25th, and 75th percentile market value funding ratios for the 134 state pension systems over the last ten fiscal years. Historically, the market value funding ratios for our sample changed little over fiscal 2002 and 2003, then experienced a fairly steady improvement through fiscal 2007. In fiscal 2008 and 2009 however, funding ratios broke trend and rapidly declined. Fiscal 2010 saw funding ratios reverse course and stage a moderate recovery that continued into fiscal 2011, then reversed course in fiscal 2012.

Exhibit 4
Market Value Funding Ratios by Fiscal Year for 134 Plans

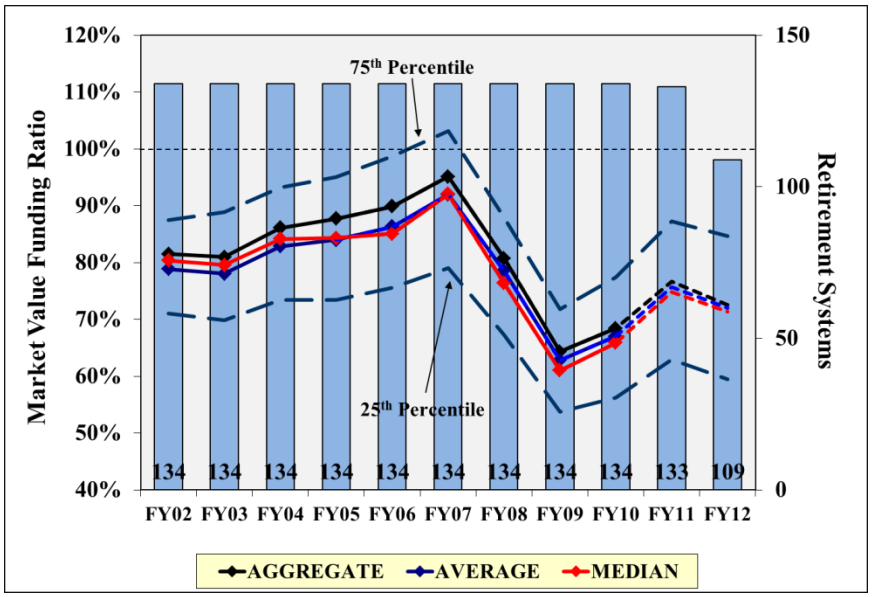


Exhibit 5 shows the same information as Exhibit 4, except it uses the actuarial value of assets to determine funding ratios. In contrast with Exhibit 4's more volatile market value-based funding ratio time series, Exhibit 5 shows an essentially steady, gradual decline in funding ratios over the entire ten-year period. As noted above, accounting conventions smooth actuarial values of assets over forecast periods in order to reduce the volatility of projected sponsor contributions to the pension plan.

Exhibit 5
Actuarial Value Funding Ratios by Fiscal Year for 134 Plans

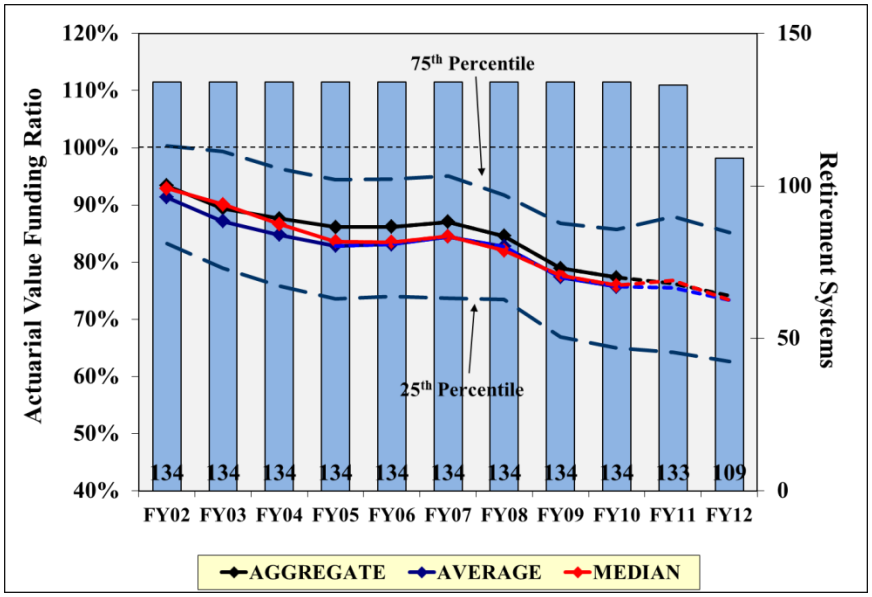
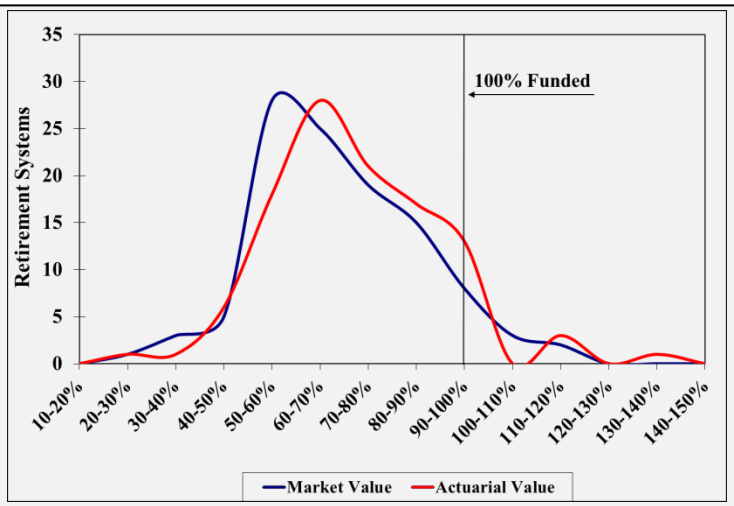


Exhibit 6 gives a more detailed picture of the fiscal condition for the 109 state retirement systems that reported actuarial values for 2012.

Exhibit 6
Distribution of 109 State Pension Systems by Fiscal Year 2012 Funding Ratio

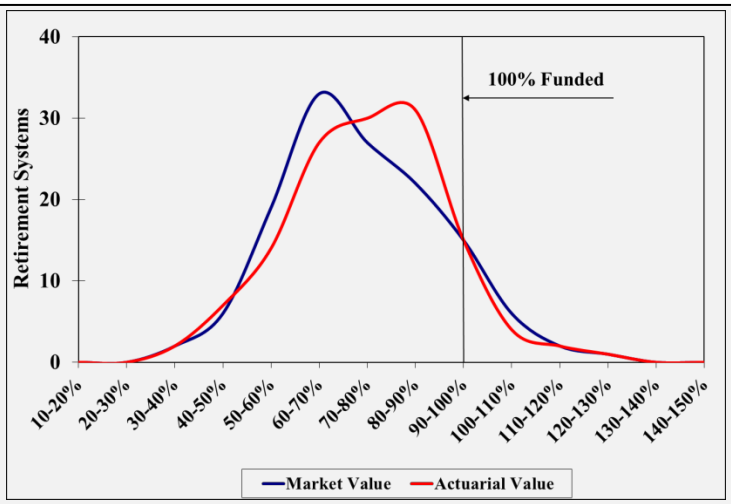


	Bucket Count					Cumulative Count			
Distribution	Market Value		Actuarial Value		Distribution	Market Value		Actuarial Value	
	Count	% of Total	Count	% of Total		Count	% of Total	Count	% of Total
0-50%	9	8%	8	7%	0-50%	9	8%	8	7%
50-60%	28	26%	18	17%	0-60%	37	34%	26	24%
60-70%	25	23%	28	26%	0-70%	62	57%	54	50%
70-80%	19	17%	21	19%	0-80%	81	74%	75	69%
80-90%	15	14%	17	16%	0-90%	96	88%	92	84%
90-100%	8	7%	13	12%	0-100%	104	95%	105	96%
100-110%	3	3%	0	0%	0-110%	107	98%	105	96%
110-120%	2	2%	3	3%	0-120%	109	100%	108	99%
120-130%	0	0%	0	0%	0-130%	109	100%	108	99%
130-140%	0	0%	1	1%	0-140%	109	100%	109	100%
140-150%	0	0%	0	0%	0-150%	109	100%	109	100%
Total	109	100%	109	100%	Total	109	100%	109	100%

We have noted above that 95% of these 109 plans with 2012 actuarial data, or 104 plans, are underfunded; Exhibit 6 demonstrates the extent of the shortfall. Nine plans have assets less than 50% of liabilities; 62 plans have assets less than 70% of liabilities; and 81 plans have assets less than 80% of liabilities. Using the actuarial value of assets to determine funding ratios, 105 plans have assets below liabilities. Eight plans have assets less than 50% of liabilities; 54 plans have assets less than 70% of liabilities; and 75 plans have assets less than 80% of liabilities.

Similar to Exhibit 6, Exhibit 7 examines the fiscal condition of the 133 state retirement systems that reported actuarial values for 2011.

Exhibit 7
Distribution of 133 State Pension Systems by Fiscal Year 2011 Funding Ratio



Distribution	Bucket Count				Distribution	Cumulative Count			
	Market Value		Actuarial Value			Market Value		Actuarial Value	
	Count	% of Total	Count	% of Total		Count	% of Total	Count	% of Total
0-50%	8	6%	9	7%	0-50%	8	6%	9	7%
50-60%	19	14%	14	11%	0-60%	27	20%	23	17%
60-70%	33	25%	27	20%	0-70%	60	45%	50	38%
70-80%	27	20%	30	23%	0-80%	87	65%	80	60%
80-90%	22	17%	31	23%	0-90%	109	82%	111	83%
90-100%	15	11%	15	11%	0-100%	124	93%	126	95%
100-110%	6	5%	4	3%	0-110%	130	98%	130	98%
110-120%	2	2%	2	2%	0-120%	132	99%	132	99%
120-130%	1	1%	1	1%	0-130%	133	100%	133	100%
130-140%	0	0%	0	0%	0-140%	133	100%	133	100%
140-150%	0	0%	0	0%	0-150%	133	100%	133	100%
Total	133	100%	133	100%	Total	133	100%	133	100%

Using the market value of assets to determine funding ratios, 124 of the 133 plans, or 93%, had assets less than liabilities. Eight plans had assets less than 50% of liabilities; 60 plans had assets less than 70% of liabilities; and 87 plans had assets less than 80% of liabilities. Using the actuarial value of assets to determine funding ratios, 126 of the 133 plans, or 95%, had assets less than liabilities. Nine plans had assets less than 50% of liabilities; 50 plans had assets less than 70% of liabilities; and 80 plans had assets less than 80% of liabilities.

Unfunded Actuarial Accrued Liability

The financial health of retirement systems can also be measured by comparing the size of the unfunded actuarial accrued liability (UAAL) to relevant metrics. Since assets under

Governmental Accounting Standards Board (GASB) Statement No. 25[2] are based on actuarial values, this section calculates the UAAL using actuarial value of assets.

Exhibit 8 shows the median size of the UAAL relative to the covered payroll during the last eleven fiscal years for the 134 retirement systems. Exhibit 8 also shows the 25th and 75th percentile for each year. UAAL has increased over the past decade, with an especially steep climb during the most recent recession:

Exhibit 8
UAAL as a % of Covered Payroll by Fiscal Year for 134 Plans

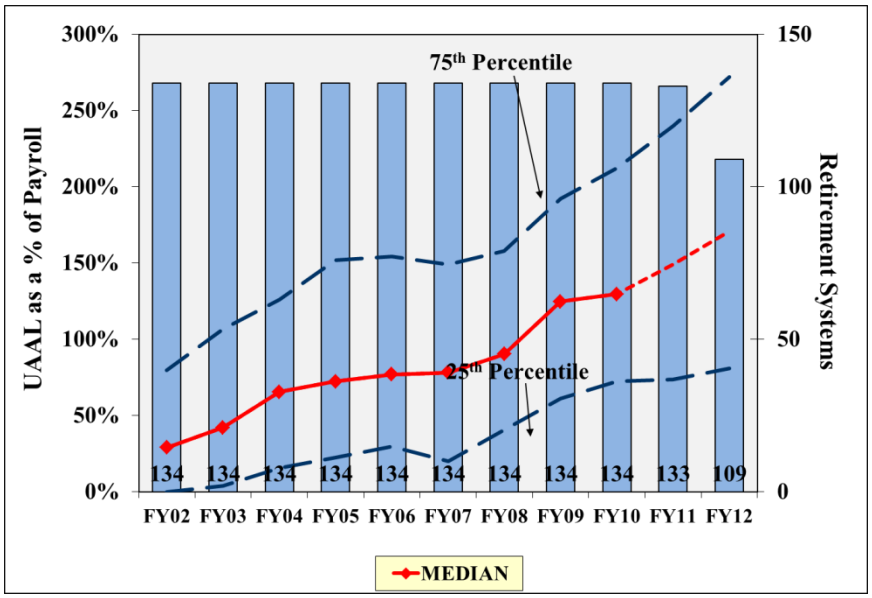


Exhibit 9 shows the median size of the UAAL relative to the actuarial value of assets during the last eleven fiscal years for the 134 plans. Exhibit 9 also shows the 25th and 75th percentile for each year.

[2] GASB No. 25, Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans.

Exhibit 9
UAAL as a % of Actuarial Value of Assets by Fiscal Year for 134 Plans

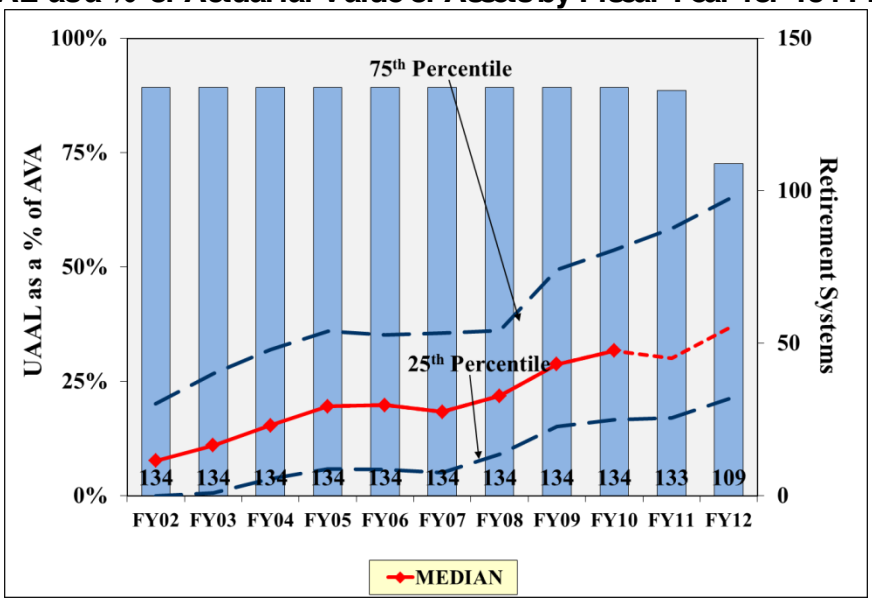
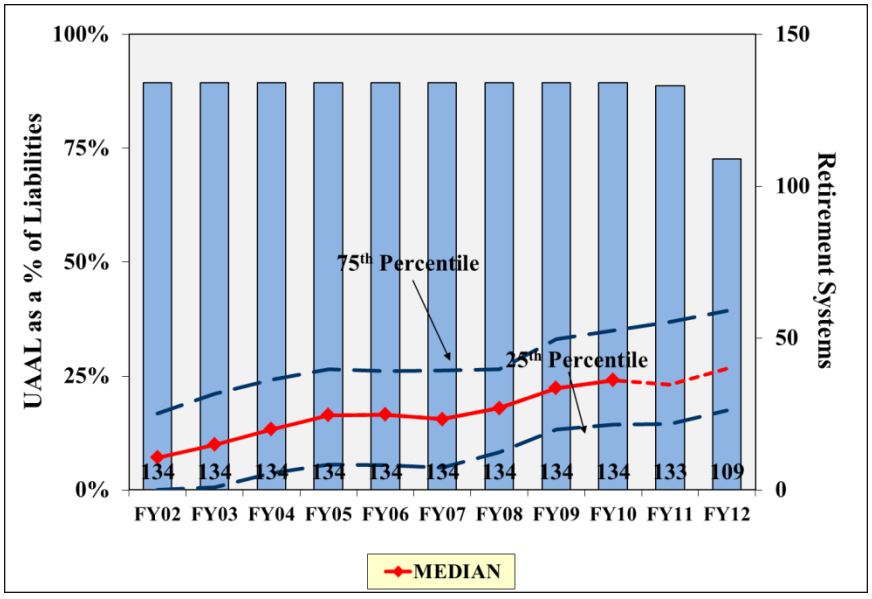


Exhibit 10 shows the median size of the UAAL relative to the actuarial accrued liability during the last eleven years for all 126 retirement systems. Exhibit 10 also shows the 25th and 75th percentile for each year.

Exhibit 10
UAAL as a % of Accrued Liabilities by Fiscal Year for 134 Plans



From 2005 to 2008, the UAAL had generally stabilized relative to all metrics. Over 2008 and 2009, however, poor market performance pushed the covered payroll ratio and the 25th and 75th

percentiles of the actuarial value of assets and accrued liability higher. It bears repeating that actuarial valuation methodology typically employs smoothing formulae in order to reduce the impact of market fluctuations when determining pension fund contributions. If the UAAL were calculated using the market value of assets, the negative market returns experienced during fiscal 2008 and 2009 would have led to a much larger increase in the UAAL relative to these metrics, indicating a more substantial deterioration in the financial health of most state retirement systems. Due to the strong markets experienced during fiscal 2010 and 2011, UAAL as a percent of asset market value fell sharply over those two years. However, fiscal 2012 found UAAL growth outpacing asset growth, reversing the trend of the prior two years.

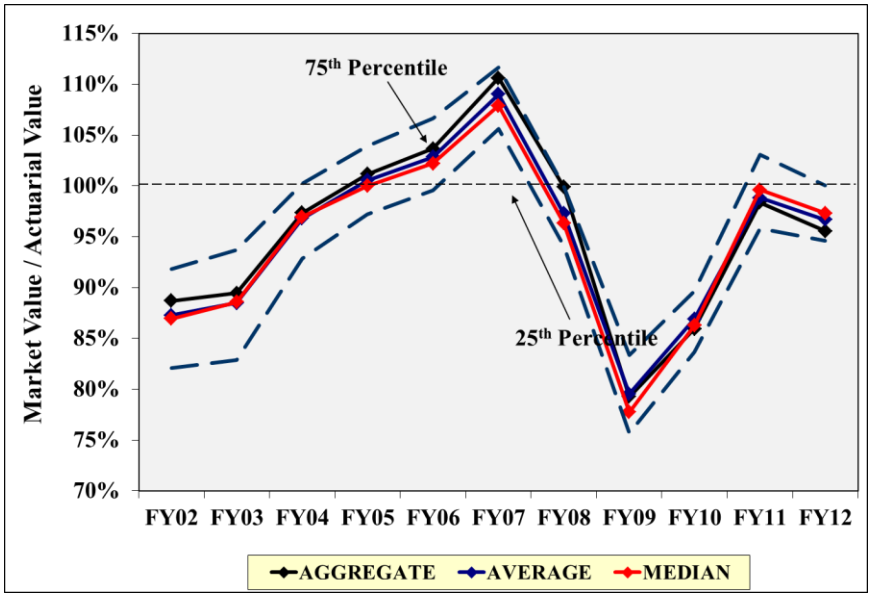
Market Value of Assets versus Actuarial Value of Assets

As mentioned above, the actuarial value of assets is often calculated using a smoothing method in order to reduce the effects of market volatility when determining contribution rates. For example, a five-year smooth market value method would recognize 20% of the gain or loss[3] in the market value of assets over five years. Therefore, a plan valuation as of July 1, 2013 utilizing a five-year smoothing methodology will recognize the sharp global equity sell-off of late 2008 and early 2009 as well as the subsequent, ongoing recovery in capital markets.

Exhibit 11 displays the aggregate, average, and median ratio of the market value of assets (MVA) as a percentage of the actuarial value of assets (AVA) during the last ten fiscal years for the 109 state plans that reported actuarial values for 2012. Exhibit 11 also shows the 25th and 75th percentiles for each year. From FY03 to FY07, actuarial values declined relative to market values since they were still reflecting the poor market returns experienced during the bust of the internet stock bubble. In FY08, the actuarial value of assets recognizes mostly positive market returns experienced between 2003 and 2007. Driving the overall ratio lower for FY08 and FY09 is the severe market sell-off in late 2007 through early 2009, which is fully reflected in plan assets at market value but only partially recognized in actuarial values. The notable rally in global capital markets over fiscal years 2010 and 2011 resulted in a fairly sharp increase in the MVA/AVA ratio since fiscal 2009.

[3] A gain (loss) occurs when the actual rate of return is greater than (less than) the assumed rate of return.

Exhibit 11
MVA as a Percentage of AVA by Fiscal Year for 109 Plans



Asset Allocation

In this section we examine the investment strategies employed by the state retirement systems. Exhibit 12 provides a snapshot of the average asset allocation as of the latest reported fiscal year-end across all 134 state retirement systems.

Exhibit 12
Average Asset Allocation for State Pension Plans

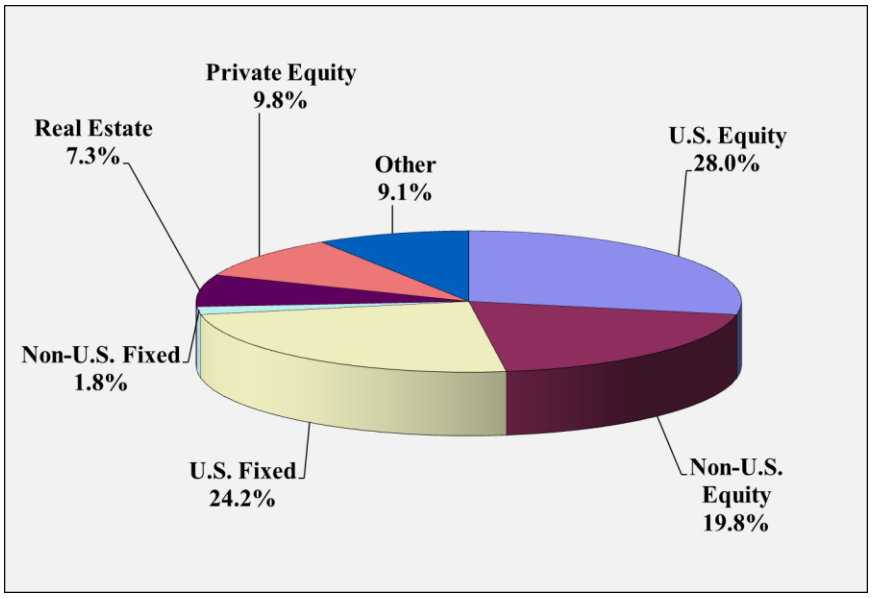


Exhibit 13 examines the change in average asset allocation over the last ten years. During this period, the average allocations to Non-U.S. equities increased from 12.9% to 19.8% while allocations to U.S. Bonds decreased from 35.2% to 24.2%.

Exhibit 13
Change in Average Asset Allocation for State Pension Plans

				Change in Exposure	
Equity	2002	2007	2012	02-12	07-12
U.S. Equity	42.3 %	41.0 %	28.0 %	-14.3 %	-13.0 %
Non-U.S. Equity	12.9	18.2	19.8	6.9	1.6
Real Estate	4.0	5.2	7.3	3.3	2.1
Private Equity	4.2	4.6	9.8	5.6	5.2
Equity Subtotal	63.4	69.0	64.8	1.4	-4.2
Debt					
U.S. Fixed	35.2	26.4	24.2	-11.0	-2.2
Non-U.S. Fixed	1.4	0.9	1.8	0.4	0.9
Other	0.0	3.7	9.2	9.2	5.5
Debt Subtotal	36.6	31.0	35.2	-1.4	4.2
Return *	6.5	6.9	6.9	0.4	0.0
Risk *	10.9	11.9	11.7	0.8	-0.2

** Return and Risk are based on Wilshire Consulting's current asset class assumptions (Exhibit 14).*

Overall equity exposure, comprised of U.S. and non-U.S. public market equities along with real estate and private equity, increased 1.4% over the past decade, while overall debt exposure, comprised of U.S. and non-U.S. fixed income and other non-equity assets (itself consisting of cash and cash equivalents as well as hedge funds and other absolute return/zero net-beta strategies), decreased. However, it must be noted that plans' exposures to U.S. public market equity and U.S. fixed income over this period fell while allocations to non-U.S. assets, real estate, private market equity and other risk assets increased. One can propose several possible explanations, alone or in combination:

- Depressed U.S. equity holdings still recovering from the recent market plunge;
- Rotation out of the relatively efficient U.S. stock and bond markets into less-efficient asset spaces;
- Plan sponsors reducing the home-market bias in their fund holdings;
- Plan sponsors increasing asset diversification in an attempt to de-risk the Total Fund.
- Plan sponsors increasing their exposures to more leveraged strategies, such as private market equity, in an effort to meet return targets.

Portfolio expected return and risk are calculated by combining Wilshire's assumptions for the major asset classes and each retirement system's actual asset allocation. Exhibit 13 calculates the expected return and risk based on the average asset allocations from 2002, 2007 and 2012

using Wilshire's current long-term return and risk assumptions illustrated in Exhibit 14. The redeployment of assets over the past decade out of U.S. public markets and into offshore and alternative assets has caused the average state pension plan to move towards a slightly higher expected return and risk profile along the efficient frontier. However, the general decrease in equity exposure and underlying shift into a heavier mix of real estate and private equity from 2007 to 2012 provides a lower risk expectation for the average state plan.

Exhibit 14
Wilshire's 2013 Capital Market Assumptions

	Expected Return	Risk
U.S. Equity	7.75 %	17.0 %
Non-U.S. Equity	7.75	18.0
Private Equity	10.75	27.5
Real Estate	5.30	15.0
U.S. Bonds	3.25	5.0
Non-U.S Bonds	2.90	3.5

Exhibit 15 contains summary statistics on asset allocation for all state retirement systems. The median allocation[4] is 27.1% to U.S. equities and 18.1% to Non-U.S. equities. However, as the lowest and highest columns suggest, there is considerable variability in allocations among individual systems. Wilshire estimates that the median state pension fund has an expected return of 6.9%. This result is 0.9% less than the current median actuarial interest rate of 7.8%. It is important to note that Wilshire's long-term asset assumptions do not include any expectations from active management and are targeted at a 10-year time horizon. By contrast, the actuarial discount rate assumed by plans is typically geared at a longer-term horizon and includes all anticipated sources of return. As such, while we present these data for illustrative purposes, they are not directly comparable (i.e. Wilshire's assumptions are primarily derived to assist in conducting asset allocation studies and are not put forth as a metric to formulate an assumed actuarial rate of return).

[4] The "Median" column in Exhibit 15 represents the median for each asset class and therefore does not sum to 100%. The median expected return is based on the median fund return, not on the median asset mix.

Exhibit 15
Summary Asset Allocation Statistics for State Pension Plans

	Lowest (%)	Median (%)	Highest (%)
U.S. Equity	0.0 %	27.1 %	65.0 %
Non-U.S. Equity	0.0	18.1	55.5
Private Equity	0.0	8.6	26.8
Real Estate	0.0	7.4	16.9
U.S. Bonds	10.6	23.6	53.4
Non-U.S Bonds	0.0	0.0	9.5
Hedge Funds	0.0	1.4	26.5
Other	0.0	3.6	46.5
Expected Returns	**5.4 %**	**6.9 %**	**8.0 %**

Exhibit 16 plots the expected return and risk for each of the 134 state retirement systems based upon their actual asset allocation. Systems that plot in the upper right employ more aggressive asset mixes while systems that plot in the lower left represent those with more conservative mixes. The dashed horizontal line, equal to 7.8%, represents the current median actuarial interest rate assumption employed by state pension plans.

Using Wilshire's return forecasts, thirteen of the 134 state retirement systems are expected to earn long-term asset returns that equal or exceed their actuarial interest rate assumption. It is again important to note that Wilshire return assumptions represent beta only, with no projection of alpha from active management, and may differ in time horizon (10+ years) from the methodologies underlying actuarial interest rate assumptions (20 to 30+ years).

Exhibit 16
Projected Return & Risk Forecasts for State Pension Plans

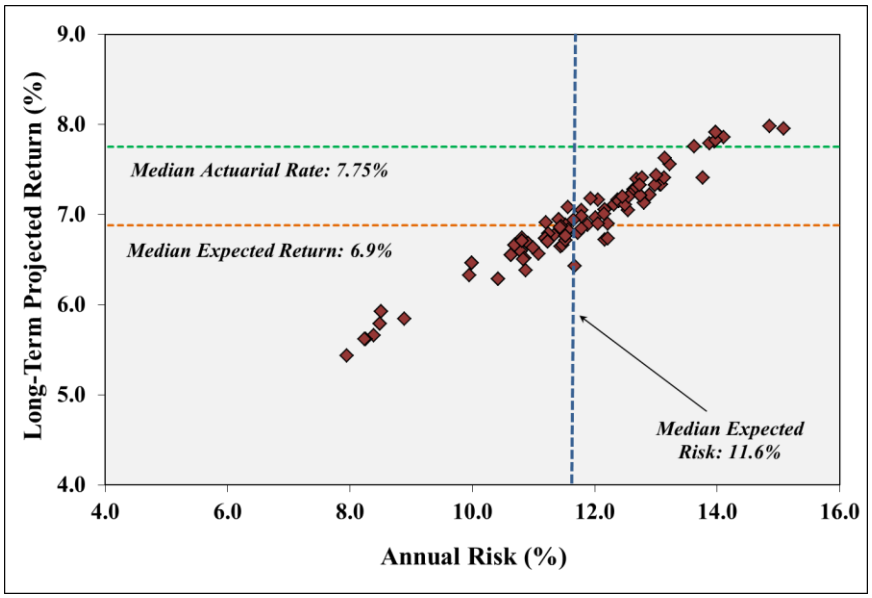
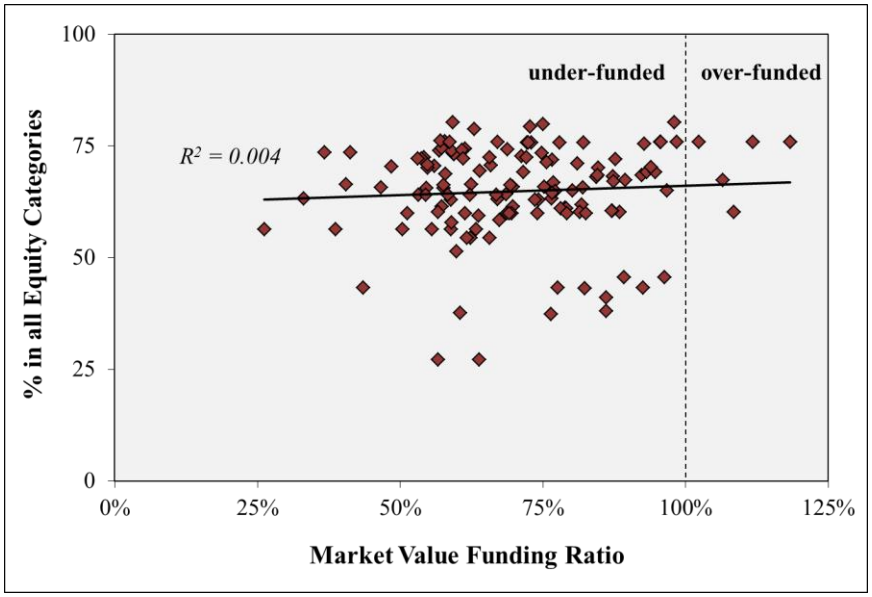


Exhibit 17 addresses the relationship between asset allocation and funding for all state systems. The allocation to equity asset classes, a proxy for investment aggressiveness, is plotted on the vertical scale. The market value funding ratio is on the horizontal scale.

Exhibit 17
Asset Allocation & Actuarial Funding Ratios for State Pension Plans



The vertical line in Exhibit 17 separates overfunded plans from underfunded plans. Casual observation uncovers no pattern connecting funded ratio to equity exposure, and in fact the R-squared between the total equity exposures and funding ratios of these plans is basically zero. In other words, there is no discernable relationship between asset allocation and funding. State retirement systems show a broad spectrum of asset allocations that appear to be unrelated to the size of their unfunded liabilities.[5]

[5] We would like to thank Mike Rush, Andre Minassian and Razmik Kirakosyan for their diligence in the data collection for this report.

Appendix A: State Retirement Systems[6]

Retirement System	Retirement System	Report Date
Alabama ERS	Alabama Employees' Retirement System	9/30/2012
Alabama TRS	Alabama Teachers' Retirement System	9/30/2012
Alaska PERS	Alaska Public Employees' Retirement System	6/30/2012
Alaska TRS	Alaska Teachers' Retirement System	6/30/2012
Arizona PSPRS	Arizona Public Safety Personnel Retirement System	6/30/2012
Arizona SRS	Arizona State Retirement System	6/30/2012
Arkansas Highway ERS	Arkansas Highway Employees Retirement System	6/30/2011
Arkansas PERS	Arkansas Public Employees Retirement System	6/30/2010
Arkansas TRS	Arkansas Teachers Retirement System	6/30/2010
California PERS	California Public Employees' Retirement System	6/30/2012
California Regents	The Regents of the University of California	6/30/2012
California STRS	California State Teachers' Retirement System	6/30/2012
Colorado Fire & Police	Colorado Fire & Police Pension Association	12/31/2011
Colorado PERA: Municipal	Colorado PERA: Municipal Division Trust Fund	12/31/2011
Colorado PERA: State & School	Colorado PERA: State & School Division Trust Fund	12/31/2011
Connecticut SERS	Connecticut State Employees' Retirement System	6/30/2012
Connecticut TRS	Connecticut State Teacher's Retirement System	6/30/2012
DC Police & Fire	District of Columbia Police Officers & Fire Fighters' Retirement System	9/30/2012
DC TRS	District of Columbia Teachers Retirement System	9/30/2012
Delaware PERS	Delaware Public Employees' Retirement System	6/30/2012
Florida RS	Florida Retirement Systems	6/30/2011
Georgia ERS	Georgia Employees Retirement System	6/30/2012
Georgia TRS	Georgia Teachers Retirement System	6/30/2012
Hawaii ERS	Hawaii Employees' Retirement System	6/30/2012
Idaho FRF	Idaho Firefighters' Retirement Fund	6/30/2012
Idaho PERSI	Idaho Public Employee Retirement Fund Base Plan	6/30/2012
Illinois Muni Ret Fund	Illinois Municipal Retirement Fund	12/31/2011
Illinois SERS	Illinois State Employees' Retirement System	6/30/2012
Illinois SURS	Illinois State Universities Retirement System	6/30/2012
Illinois TRS	Illinois State Teachers' Retirement System	6/30/2012
Indiana PERF: Employees	Indiana Public Employees' Retirement Fund: Employees	6/30/2012
Indiana PERF: Police & Fire	Indiana PERF: Police Officers' & Firefighters' Pension & Disability Fund	6/30/2012
Indiana TRF	Indiana State Teachers Retirement Fund	6/30/2012
Iowa Fire & Police	Iowa Municipal Fire & Police Retirement System	6/30/2012
Iowa PERS	Iowa Public Employees Retirement System	6/30/2012
Kansas PERS	Kansas Public Employees Retirement System	6/30/2012
Kentucky RS: CERS Hazardous	Kentucky Employees Retirement System: County Hazardous Employees	6/30/2012
Kentucky RS: CERS Non-Hazardous	Kentucky Employees Retirement System: County Non-Hazardous Employees	6/30/2012
Kentucky RS: KERS Hazardous	Kentucky Employees Retirement System: State Hazardous Employees	6/30/2012
Kentucky RS: KERS Non-Hazardous	Kentucky Employees Retirement System: State Non-Hazardous Employees	6/30/2012
Kentucky RS: State Police	Kentucky Employees Retirement System: State Police Retirement System	6/30/2012
Kentucky TRS	Kentucky Teachers' Retirement System	6/30/2012
Louisiana School ERS	Louisiana School Employees' Retirement System	6/30/2012
Louisiana SERS	Louisiana State Employees' Retirement Systems	6/30/2012
Louisiana State Police	Louisiana State Police Pension & Retirement System	6/30/2012

[6] All state plan information is obtained from public information sources.

Appendix A: (cont.)

Retirement System	Retirement System	Report Date
Louisiana TRS	Louisiana Teachers Retirement System	6/30/2012
Maine SRS	Maine State Retirement System	6/30/2012
Maryland SRPS: Employees	Maryland State Retirement & Pension System: Employees	6/30/2012
Maryland SRPS: State Police	Maryland State Retirement & Pension System: State Police	6/30/2012
Maryland SRPS: Teachers	Maryland State Retirement & Pension System: Teachers	6/30/2012
Massachusetts SRB	Massachusetts Public Employee Retirement Administration Commission: SRB	6/30/2012
Massachusetts Teachers	Massachusetts Public Employee Retirement Administration Commission: Teachers	6/30/2012
Michigan Municipal	Michigan Municipal Employees Retirement System	12/31/2011
Michigan Public School ERS	Michigan Public School Employees Retirement System	9/30/2011
Michigan SERS	Michigan State Employees Retirement System	9/30/2011
Michigan State Police	Michigan State Police Retirement System	9/30/2011
Minnesota PERA: Employees	Minnesota Public Employees Retirement Association: Employees	6/30/2012
Minnesota PERA: Police & Fire	Minnesota Public Employees Retirement Association: Police & Fire	6/30/2012
Minnesota SRS: Employees	Minnesota State Retirement System: Employees	6/30/2012
Minnesota SRS: State Patrol	Minnesota State Retirement System: State Patrol	6/30/2012
Minnesota TRA	Minnesota Teachers Retirement Association	6/30/2012
Mississippi PERS	Mississippi Public Employees' Retirement System	6/30/2012
Missouri ERS	Missouri State Employee Retirement System	6/30/2012
Missouri Highway ERS	Missouri Highway & Transportation Employees and Highway Patrol Retirement System	6/30/2012
Missouri PEERS	Missouri Public Education Employee Retirement System	6/30/2012
Missouri PSRS	Missouri Public School Retirement System	6/30/2012
Montana PERB	Montana Public Employees Retirement Board	6/30/2012
Montana TRS	Montana Teachers' Retirement System	6/30/2012
Nebraska RS	Nebraska Retirement System	6/30/2012
Nevada PERS	Nevada Public Employees' Retirement System	6/30/2011
New Hampshire RS: Employees	New Hampshire Employees Retirement System	6/30/2012
New Hampshire RS: Police & Fire	New Hampshire Firefighters & Police Officers Retirement System	6/30/2012
New Hampshire RS: Teachers	New Hampshire Teachers Retirement System	6/30/2012
New Jersey PERS	New Jersey Public Employees Retirement System	6/30/2012
New Jersey Police & Fire	New Jersey Police & Firemen's Retirement System	6/30/2012
New Jersey State Police	New Jersey State Police Retirement System	6/30/2012
New Jersey TPAF	New Jersey Teachers' Pension & Annuity Fund	6/30/2012
New Mexico ERB	New Mexico Educational Retirement System	6/30/2012
New Mexico PERA	New Mexico Public Employees Retirement Association	6/30/2012
New York STRS	New York State Teachers Retirement System	6/30/2012
New York: ERS	New York State & Local Employees' Retirement System	3/31/2012
New York: Police & Fire	New York Police & Fire Retirement System	3/31/2012
North Carolina Local ERS	North Carolina Local Governmental Employees' Retirement System	6/30/2012
North Carolina TSERS	North Carolina Teachers' & State Employees' Retirement System	6/30/2012
North Dakota PERS	North Dakota Public Employees Retirement System	6/30/2012
North Dakota TFFR	North Dakota Teachers' Fund for Retirement	6/30/2012
Ohio PERS	Ohio Public Employees Retirement System	12/31/2011
Ohio Police & Fire	Ohio Police & Fire Pension Fund	12/31/2011
Ohio School Employees RS	Ohio School Employees Retirement System	6/30/2012
Ohio STRS	Ohio State Teachers Retirement System	6/30/2012

Appendix A: (cont.)

Retirement System	Retirement System	Report Date
Oklahoma Firefighters	Oklahoma Firefighters Pension & Retirement System	6/30/2012
Oklahoma PERS	Oklahoma Public Employees Retirement System	6/30/2012
Oklahoma Police	Oklahoma Police Pension & Retirement System	6/30/2012
Oklahoma TRS	Oklahoma Teachers Retirement System	6/30/2011
Oregon PERS	Oregon Public Employees Retirement System	6/30/2012
Pennsylvania PSERS	Pennsylvania Public School Employees' Retirement System	6/30/2012
Pennsylvania SERS	Pennsylvania State Employees' Retirement System	12/31/2011
Rhode Island ERS	Rhode Island Employees Retirement System	6/30/2012
Rhode Island JRBT	Rhode Island Judicial Retirement Benefits Trust	6/30/2012
Rhode Island MERS	Rhode Island Municipal Employees Retirement System	6/30/2012
Rhode Island SPRBT	Rhode Island State Police Retirement Benefits Trust	6/30/2012
South Carolina Police	South Carolina Police Officers Retirement System	6/30/2012
South Carolina RS	South Carolina Retirement System	6/30/2012
South Dakota RS	South Dakota Retirement System	6/30/2012
Tennessee PSPP	Tennessee Consolidated Retirement System Political Subdivision Pension Plan	6/30/2012
Tennessee SETHEEP	Tennessee Consolidated Retirement System State Employees, Teachers, Higher Education Employees Pension Plan	6/30/2012
Texas CDRS	Texas County & District Retirement System	12/31/2011
Texas ERS	Texas Employees Retirement System	8/31/2012
Texas LECOSRF	Texas Law Enforcement & Custodial Officers Supplemental Retirement Fund	8/31/2012
Texas Municipal	Texas Municipal Retirement System	12/31/2011
Texas TRS	Texas Teachers Retirement System	8/31/2012
Utah Contributory RS	Utah Contributory Retirement System	12/31/2011
Utah Firefighters RS	Utah Firefighters Retirement System	12/31/2011
Utah Noncontributory RS	Utah Noncontributory Retirement System	12/31/2011
Utah Public Safety RS	Utah Public Safety Retirement System	12/31/2011
Vermont MERS	Vermont Municipal Employees' Retirement System	6/30/2012
Vermont SERS	Vermont State Employees' Retirement System	6/30/2012
Vermont TRS	Vermont State Teacher's Retirement System	6/30/2012
Virginia JRS	Virginia Judicial Retirement System	6/30/2012
Virginia LORS	Virginia Law Officers' Retirement System	6/30/2012
Virginia RS	Virginia Retirement System	6/30/2012
Virginia SPORS	Virginia State Police Officers' Retirement System	6/30/2012
Washington LEOFF 1	Washington Law Enforcement Officers & Fire Fighters' Retirement System 1	6/30/2012
Washington LEOFF 2	Washington Law Enforcement Officers & Fire Fighters' Retirement System 2	6/30/2012
Washington PERS 1	Washington Public Employees' Retirement System Plan 1	6/30/2012
Washington PERS 2/3	Washington Public Employees' Retirement System Plan 2	6/30/2012
Washington SERS 2 & 3	Washington School Employees' Retirement System Plan 2 & 3	6/30/2012
Washington TRS 1	Washington Teachers' Retirement System Plan 1	6/30/2012
Washington TRS 2 & 3	Washington Teachers' Retirement System Plan 2 & 3	6/30/2012
Washington WSPRS 1 & 2	Washington State Patrol Retirement System	6/30/2012
West Virginia PERS	West Virginia Public Employees Retirement System	6/30/2012
West Virginia TRS	West Virginia Teachers Retirement System	6/30/2012
Wisconsin RS	Wisconsin Retirement System	12/31/2010
Wyoming RS	Wyoming Retirement System	12/31/2011

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